

# Light and Lighting

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Illuminating  
Engineering  
Society.

Incorporating  
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Edited by J. STEWART DOW

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## The Force of Example

"THE Lighting of Public Buildings" (see p. 169) comprises many diverse problems. Schools, libraries, offices, museums, hospitals—all have their own requirements.

But there is one consideration that applies to all other buildings under the care of Governments or Local Authorities. **They should serve as examples.**

Governments and Authorities should give a lead to the public. In schools children should become familiar with good lighting conditions, so that they may expect them and (so far as they have the power) provide them when they go out into the world. Visitors to municipal offices should meet with pleasant lighting; they should not be repelled by dark and dismal rooms. The contents of museums and picture galleries should be so lighted as to be freely revealed and shown to the best advantage. Lighting in hospitals should at least satisfy Florence Nightingale's dictum—it should do the sick no harm!

"Showing" is always a better means of securing improvement than "preaching"—sometimes, we think, it is the *only* method.



### Codes of Industrial Lighting

A pertinent letter from Mr. L. D. Wright (past president of the I.E.S. in Australia) on the above subject appears in *Illuminating Engineering* (September, 1943). He compares the British, American, and Australian Codes, and mentions that Australia has mainly followed the British values of illumination, which are somewhat lower than those adopted in the United States. His chief point, however, is the absence in the American Code of detailed requirements in regard to quality (e.g., absence of glare, desirable contrast, etc.), on which the Australian Code is much more specific—indeed, one has the impression that the limitations in brightness imposed might sometimes prove rather severe in practice. Mr. Wright might have criticised, on similar grounds the British Code, which, as we recalled recently, only deals with this aspect in a very general manner. This is a deficiency which we hope to see remedied in course of time. In the meantime, Australia deserves every credit for their effort to solve the problem. There, as here, a substantial improvement in lighting conditions has followed the adoption of the Code, which is also leading to the introduction of better-class fittings and even to a "painting programme" in the interests of better seeing.

### An I.E.S. Medal

We notice the announcement that the Illuminating Engineering Society in America is instituting a new award—a gold medal—to be presented from time to time to those who have achieved special eminence in the field of illuminating engineering. The award seems to serve a purpose somewhat similar to the rare distinction of "honorary membership" in this country, though it is apparently intended to be based mainly on scientific or technical achievement rather than service in a general sense.

### I.E.S. Transactions

The attention of I.E.S. members is drawn to the notice inserted in our last issue and repeated in the current issue of the *TRANSACTIONS*. After the receipt of this second intimation copies of the *TRANSACTIONS* will be sent *only* to those members who make application for them. This course is similar to that adopted by some other societies and is enforced by the paper situation. No doubt there will be some members who are quite willing to forgo the receipt of *TRANSACTIONS*. But all those who do wish to receive them should apply. There will doubtless be enough to go round.

## Forthcoming I.E.S. Meetings (Provisional List)

### SESSIONAL MEETINGS IN LONDON

#### 1943.

**Dec. 14th.** Discussion to be opened by Dr. S. ENGLISH and Mr. R. MAXTED on **Street Lighting Specifications of the Future; Should They be Based on the Design of the Unit or the Effect of Illumination?** (Joint Meeting with the Association of Public Lighting Engineers, to be held at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W.1.) 5 p.m.

#### 1944.

**Jan. 18th.** Addresses on **The Place of Science in the Art of Lighting**, by Mr. ALISTER MACDONALD, F.R.I.B.A. (Chairman, Architectural Science Board), and Mr. R. O. ACKERLEY, F.I.E.S. (The chair will be taken by Mr. Percy Thomas, President, R.I.B.A.) (Joint Meeting with the Royal Institute of British Architects, to be held at the R.I.B.A., 66, Portland Place, London, W.1.) 5.30 p.m. (provisionally).

### MEETINGS OF CENTRES AND GROUPS

#### 1943.

**Dec. 1st.** Dr. S. ENGLISH on **The Redistribution of Lighting by Glassware.** (Meeting of the Newcastle Centre, to be held in the Minor Hall, Oxford Street, Newcastle-on-Tyne.) 5.30 p.m.

**Dec. 2nd.** Mr. PERCY THOMAS (President, R.I.B.A.), on **A Review of Lighting.** (Meeting of the Cardiff Centre, to be held in the Cardiff Corporation Demonstration Theatre, The Hayes, Cardiff.) 3 p.m.

**Dec. 6th.** Lecture on **The Future of Fluorescent Lamp Lighting.** (Meeting of the Bath and Bristol Centre, to be held in the Pump Room, Bath.) 7 p.m.

**Dec. 6th.** Address by THE CHAIRMAN of the Centre (Mr. A. KESLO). Followed by Discussion on the **Education and Training of the Illuminating Engineer.** (Meeting of the Leeds Centre, to be held in the Leeds Corporation Electricity Showrooms, The Headrow, Leeds.) 5.15 p.m.

**Dec. 6th.** Mr. J. O'L. ST. CLAIR on **Infra-Red Radiation and Its Application to Industry.** (Meeting of the Sheffield Centre, to be held at the Central Library, Tudor Place, Sheffield.) 6 p.m.

#### 1943.

**Dec. 7th.** Mr. C. J. ALLDERIDGE on **Planning An Industrial Lighting Scheme.** (Meeting of the Derby Group, to be held in the Borough of Derby Electricity Showrooms, Irongate, Derby.) 6 p.m.

**Dec. 9th.** Mr. P. HARTILL on **The Calculation of Illumination from Large Area Sources.** (Meeting of the Manchester Centre, to be held in the Reynolds Hall, College of Technology, Sackville Street, Manchester.) 2.30 p.m.

**Dec. 9th.** Mr. I. QUIGLEY on **Infra-Red Radiation; Its Industrial Application.** (Meeting of the Bradford Group, to be held in the Bradford Electricity Department Showrooms, Sunbridge Road, Bradford.) 6.45 p.m.

**Dec. 10th.** Address by Mr. GILLESPIE WILLIAMS on **The Poetry of Light.** (Meeting of the Birmingham Centre, to be held at the Crescent Theatre, Birmingham.) 6 p.m.

**Dec. 29th and 30th.** Mr. R. O. ACKERLEY on **Christmas Lectures for Children.** (Meeting of the Bradford Group.)

#### 1944.

**Jan. 5th.** **A Series of Short Papers.** (Meeting of the Newcastle Centre, to be held in the Minor Hall, Oxford Street, Newcastle-on-Tyne.) 5.30 p.m.

**Jan. 10th.** Paper by a Gas Engineer. (Meeting of the Cardiff Centre, to be held in the Cardiff Corporation Demonstration Theatre, The Hayes, Cardiff.) 3 p.m.

**Jan. 13th.** Dr. W. D. WRIGHT on **Colour Problems in Illuminating Engineering.** (Meeting of the Manchester Centre, to be held in the Reynolds Hall, College of Technology, Sackville Street, Manchester.) 2.30 p.m.

**Jan. 13th.** Mr. J. W. HOWELL on **Lighting in the Bleaching, Dyeing, Printing and Finishing Industries.** (Meeting of the Bradford Group, to be held in Bradford Electricity Department Showrooms, Sunbridge Road, Bradford.) 6.45 p.m.

**Jan. 17th.** Mr. W. R. STEVENS on **The Application of Low Pressure Fluorescent Lamps.** (Meeting of the Bath and Bristol Centre, to be held at the Grand Hotel, Broad Street, Bristol.) 7 p.m.

**Jan. 21st.** Mr. W. J. G. DAVEY on **Post War Street Lighting.** (Meeting of the Glasgow Centre, to be held in the "Cudoro" Restaurant, Glasgow.) 6 p.m.

**Jan. 28th.** Mr. J. ASHMORE on **Electric Lighting: A Contractor's Viewpoint.** (Meeting of the Birmingham Centre, to be held at the Imperial Hotel, Temple Street, Birmingham.) 6 p.m.

(Secretaries of Centres and Groups are requested to send in particulars of meetings in advance, mentioning subject, author, place, date and time of meeting.)

## "The Development of Illuminating Engineering"

The trend of thought in the lighting field—the modern insistence on effect rather than engineering data—was well illustrated in the delightful address on the above subject given by Mr. James A. Mitchell to the I.E.S. Newcastle Centre on November 3. He and others attempted definitions of illuminating engineering, some rather painstaking, others terse. There was, for instance, the suggestion that it is "10 per cent. art, 10 per cent. science, and 80 per cent. common sense" (Mr. Stewart), and that the duty of the illuminating engineer is to provide the means whereby a man can burn the candle at both ends without injury to his health or his eyes (Mr. Gregory).

Mr. Mitchell, in one part of his address, dealt somewhat fully with photometry, but it was the essence of his homily that measurements of light and specifications of foot-candles are only means to an end. "The study of sources and measurements, the elaboration of terms and analysis, is not enough. Illuminating engineering must also be studied as an art." Further, Mr. Mitchell contended, light is much more than the objective phenomenon we see—and in pursuing this theme he recalled the philosophy of Bishop Berkeley. He quoted Dr. Lythgoe's well-known paper in support of the contention that a blameless installation of artificial light is apt to appear dull. Mr. P. J. Waldram's heart would doubtless have been gladdened by the declaration: "Windows are more than light sources. They are the link which establishes the harmony of the room with the outside world."

Contributors to the discussion raised several interesting points. Mr. Napper's contention that many sermons did not strike home owing to the glare from the east window was a palpable hit. Mr. Gregory gave pleasing recollections of primitive lighting in a Spanish inn. Mr. Pringle adduced experience in the black-out

in favour of lighting the pavement as well as the road, and Mr. James put in a general plea for more "art" in the training of the engineer.

## The Place of Science in the Art of Lighting

The attention of I.E.S. members is drawn to the forthcoming joint meeting with the R.I.B.A. on January 18, when the above subject is to be discussed. Particulars are included in the list of events on p. 167. Mr. Alastair MacDonald and Mr. Ackerley will together no doubt present a stimulating analysis of the art of lighting. They may be able to suggest means of assessing both the *workmanship* (as illustrated by the foot-candles provided) and the *result* (as exemplified in the impression received by the eye) of a lighting installation. We understand that Mr. Percy Thomas, President of the R.I.B.A., has consented to preside. The Society is actually under a double obligation to Mr. Thomas, as he has also consented to give an address to the Cardiff Centre on December 2—a "scoop" on which that Centre is to be congratulated.

## British Colour Council Forthcoming Exhibition

An exhibition is being arranged by the British Colour Council to occupy seven galleries of the Royal Academy (Piccadilly, London, W.1) during January and February, 1944. The exhibition will illustrate stages of production from the dyestuff and colour manufacturers to the ultimate consumer, and two galleries will be devoted specially to the Council's work. All materials in the display will be shown anonymously for the benefit of industry as a whole. One section of special interest will be devoted to the interior decoration of air liners (textiles, plastics, glass, etc.). Further information may be obtained from the Art Director and Secretary of the Colour Council (Mr. Robert F. Wilson, 29, Sackville-street, London, W.1).

## The Lighting of Public Buildings

Proceedings at a meeting of the Illuminating Engineering Society held at the E.L.M.A. Lighting Service Bureau (2, Savoy Hill, London, W.C.), at 5 p.m. on November 10th.

A pleasant incident at the I.E.S. meeting on November 10 was the return of the President, Dr. H. Buckley, who had been absent on a special mission and was now able to enter on his duties. He was introduced by the retiring President, Mr. R. O. Ackerley, to whose excellent work on behalf of the Society during his period of office a well-merited tribute was paid—which was endorsed with acclamation by all those present.

Mr. W. T. F. Souter was then called upon to read his paper on "The Lighting of Public Buildings," which, it was explained, had been undertaken partly in order to make known some of the work being done under the Society's Committee on Lighting Reconstruction. The author introduced his subject by pointing out that artificial lighting is an essential service in every public building, where it should serve as an example of how things should be done. A special illustration is the chilly and inhospitable impression often created by an ill-conceived lighting system, even when the arrangements are otherwise good.

The public buildings treated were divided into three main groups, devoted respectively to education, welfare, and recreation. A special case was made out for good lighting, both natural and artificial, in schools, on the ground that "the eye is the gateway to knowledge" and needs to be aided in every possible way. The conditions in classrooms, where an illumination of 10-15 ft.c. was

advocated, assembly halls, laboratories and workshops were discussed in turn. The good effect of light surroundings and the apparent advantages of light-coloured chalkboards were also briefly mentioned.

Conditions in public libraries, where a number of distinct lighting problems exist, were next discussed. Some of the advantages of indirect lighting, particularly in the lending department, where numbers of people are scanning the titles of books on shelves (on which they are very apt to cast shadows), were illustrated. For reading rooms and news-rooms 10-15 ft.c. (and in reference rooms at least the upper value) were recommended.

Picture galleries and museums, again, offer special problems. The author dealt in some detail with the difficult task of providing effective illumination on glass pictures and yet directing light so that troublesome reflections in the glass or varnish are avoided. An important point is the restriction of illumination falling on people examining the pictures, so that the brightness of any reflected images of them may be diminished, and also in order to accentuate the contrast and cause pictures to "stand out." In museums and galleries containing statuary the direction and degree of diffusion of the light, in addition to the standard of illumination (10 ft.c.), is of importance in revealing exhibits. Both in museums and in picture galleries opportunities for the use of artificial daylight, revealing objects in their natural colours, exist.

The Town Hall or Guildhall, as the pulse and directive force in any large community, likewise deserves good lighting. Considerable flexibility is needed in the treatment of halls, which may serve in turn for public meetings, dances, concerts, and theatrical performances. In conclusion, Mr. Souter made a special plea for the consideration of lighting in relation to architecture, a

field offering great scope for the co-operation between the lighting expert and the architect, especially in view of the newer equipment—ceiling lights and fluorescent tubes, etc.—which will doubtless find wide application in post-war lighting.

The paper was illustrated by a representative series of lantern slides, some of which are to be appear in the full version of the paper, when published in the "Transactions."

The discussion turned partly on school lighting and its importance. Mr. C. W. M. Phillips recalled that there were about five million children in the elementary schools of this country. He urged that data should be collected tracing the relation between lighting conditions, eyesight, and educational progress and quoted some American statistics—though other speakers alluded to the difficulties in drawing definite conclusions on such points. Mr. F. C. Smith discussed the special problems met with in workshops and laboratories—for example the need for "daylight" quality in connection with chemical tests involving appreciation of shades of colour. He also mentioned some of the difficulties involved in keeping bright sources of light out of the field of view with a ceiling height of only 11 ft., especially when an illumination of the order of 15 f.t.c. was to be furnished.

Other special problems, such as the lighting of operating tables and wards in hospitals, were raised by Mr. Ackerley, who pointed out that there was still a good deal to be learned in this connection

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### Mr. A. G. Higgins: New Appointment

We learn with interest that Mr. A. G. Higgins is leaving the South Metropolitan Gas Company in order to take up an appointment as Assistant Secretary to the Institution of Gas Engineers. I.E.S. members will join with us in wishing Mr. Higgins every success in his new position.

## Scientific Lighting in the Textile Industry

The first meeting of the 1943-44 Session of the I.E.S. Glasgow Centre (Scottish Area) took place on Friday, October 29, 1943, at 6.30 p.m., when Mr. J. W. Howell gave a paper on "Scientific Lighting in the Textile Industry" before a joint meeting with the Society of Dyers and Colourists.

The first portion of the paper dealt with the fundamentals of seeing, light measurement, and adequacy of illumination. Special problems in the textile industry were next mentioned, and selected processes requiring special attention were fully discussed. Different types of lighting for tappet, dobby, and jacquard looms were explained and copiously illustrated by lantern slides. Problems of the dye house and printing processes were also reviewed.

In the course of the paper reference was also made to *quality* as compared with quantity of light applied, and several special fields, such as the use of colour-corrected light when the colours of materials need careful study, and the use of infra-red radiation, were briefly treated.

The lecturer concluded by emphasizing the great advantages to be gained from good lighting, and its influence both on quality and output of work, the economic position being illustrated by a full series of graphs.

The Deputy Chairman of the Society of Dyers and Colourists, Mr. Young, presided, with Mr. J. H. Scott as supporting Chairman. A full discussion followed the delivery of the paper. Amongst I.E.S. members who spoke were Mr. F. M. Hale, Mr. A. M. Rankin, and Mr. M. W. Hime; several members of the Society of Dyers and Colourists also took part. A hearty vote of thanks to the author, proposed by Mr. Scott, terminated the proceedings.

We note with interest this instance of a joint meeting, and hope that other Centres will adopt the practice of inviting the co-operation of representatives of trades and industries, when discussing problems of mutual interest.



# CORRECT LIGHTING is an extra eye

**W**HEN eyes have to be "everywhere at once"—as they need to be on so many jobs—a third eye would be immensely valuable. Unfortunately, nature consistently refuses to provide more than two eyes. But workpeople *can* be given perfect *seeing* conditions, and that is often *as good as an extra eye*.

## EASY SEEING CURBS WASTE—

People who have not made a study of lighting are sometimes difficult to convince that correct lighting makes an enormous improvement in working conditions and output. But in factories where careful tests have been made it has been established that improved lighting has sent output up by as much as 25%. Furthermore, there is evidence that "good seeing" reduces accidents—accidents to personnel, materials, and machinery—also, by eliminating strain, reduces the number of workers absent through minor ailments.



## —AND RAISES EFFICIENCY

In good light—which is fitness-for-purpose light—a worker's *interest* is sustained; because he or she does not suffer from premature fatigue. Manual dexterity is increased; reactions are quicker; the whole standard of efficiency improves. Particularly where trainees and elderly people are employed.

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## A Post-War Plan for the Lighting Industry

In an address to the Bath-Bristol I.E.S. Centre on October 4, Mr. J. B. Harris emphasised the definite role to be played by the lighting engineer in the future and the need for recognition of his specialist services. Appreciation of the value of lighting in relation to industry during this war has hastened this recognition; but progress is still gradual.

The final objectives should be: (1) to better the lighting conditions under which we live; (2) to make lighting yield its full contribution to human welfare, and (3) to enable lighting to create conditions which are pleasant and comfortable. These objectives can only be attained if the co-operation of other specialists and responsible authorities is secured.

All lighting application should result in good vision. Lighting schemes should of necessity be planned to a certain minimum standard; but this should not be accepted as an opportunity for extreme economy. Faults, resulting not only from "cheeseparing" but also from wrong selection and location of fittings, are common. Few so-called modern lighting installations represent examples of "Design for Seeing." Every installation should be considered from the functional standpoint; but this does not mean that no thought should be given to beauty of outward form and decoration.

Mr. Harris suggested the following "Five Point Plan" for the future:—

### (1) *Wiring Regulations.*

(a) The revised I.E.E. "Regulations for the Electrical Equipment of Buildings" should be made the subject of statutory law.

(b) State Registration of Electrical Contractors in some form, ensuring that electrical work would be carried out by duly qualified contractors, should be introduced.

(c) All electrical accessories used in lighting installations should be manufactured in accordance with relevant British Standard Specifications.

### (2) *Lighting Equipment.*

British Standard Specifications should be available covering the performance of all generally accepted types of fittings, including those used with fluorescent lamps, opal glassware for offices, reflectors for shop windows, etc. Even in the case of fittings for domestic use or of a decorative type, materials might be covered by specifications.

### (3) *Lighting Regulations.*

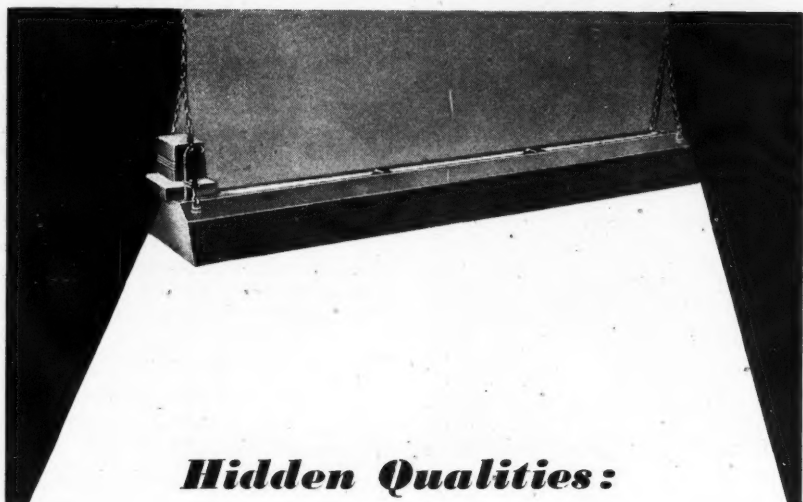
Statutory rules have been found necessary in the case of factories. It is suggested that legislation likewise offers the only solution in the case of commercial buildings, schools, hospitals, libraries, streets, railway stations, etc. In the field of domestic lighting legislation would be regarded as interference, and here education—by means of advertising, wireless talks, public lectures, exhibitions, etc.—is the best method. Such educational work could be done largely with the help of bodies interested, and the services of electricity supply undertakings, etc.

### (4) *Education of Illuminating Engineers.*

The field of the lighting specialist covers a very wide field, involving knowledge of mathematics, physics, and chemistry; psychological effects and the physiology of the eye; appreciation of art and architecture, etc. It is, therefore, suggested as now necessary to aim at the establishment of a three-year day course or a five-year evening course, culminating in the award of a university degree. There is also a definite need for modern British textbooks dealing with the theory and practice of illuminating engineering.

### (5) *Research.*

Co-ordination and central control, under the aegis of the I.E.S., is desirable. Research should be encouraged at universities, scholarships being available as in other professions. In this connection the proposal to establish a Department of Ophthalmology at Oxford University is of interest, especially as it is understood that certain aspects of lighting are to be the subject of study.



### ***Hidden Qualities:***

There is more than meets the eye in this Crompton Open Top Fluorescent Tube Unit No. CP. 454. The starter switch is enclosed, yet its action is always visible. Suspension can be by chain or conduit—in both cases the spacing centres are adjustable. The cradle provided for choke and con-

denser facilitates easy wiring. The open top prevents dark “tunnel” effects, while lamp endshields minimise flicker. Correct contour of the reflector, plus a strong welded construction, and a tough, smooth, lasting enamel, ensures effective light control.

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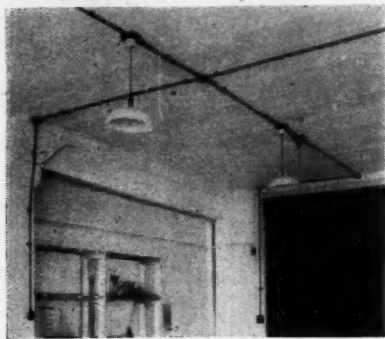
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## A Typical "Plasduct" Fluorescent Lighting Tubing Installation

(Question in the House of Commons, October 14, 1943.)

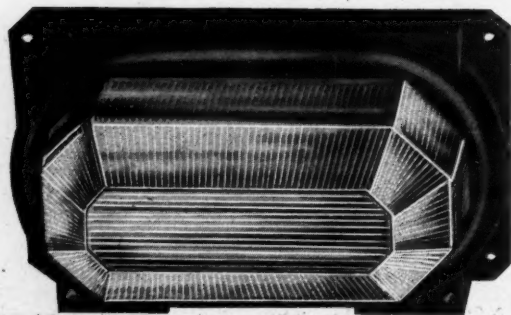


The above illustration shows a typical "Plasduct" installation. This insulating conduit system was introduced by the General Electric Company, Ltd., about a year ago. Whilst designed and produced specifically for war-time emergency installations, where speed of erection and simplicity are first essentials, the tubing system has definite inherent advantages such as good mechanical strength, resistance to moisture and corrosion, and comparatively light weight.

Sir R. Gower asked the Parliamentary Secretary to the Ministry of Works what is the present policy of his department with regard to the installation of fluorescent lighting in Government departments for use in rooms where clerical work has to be carried out continuously in artificial light; in what proportion of such rooms it is already installed; and what expert advice has been obtained as to whether fluorescent lighting is beneficial or harmful to the human eye.

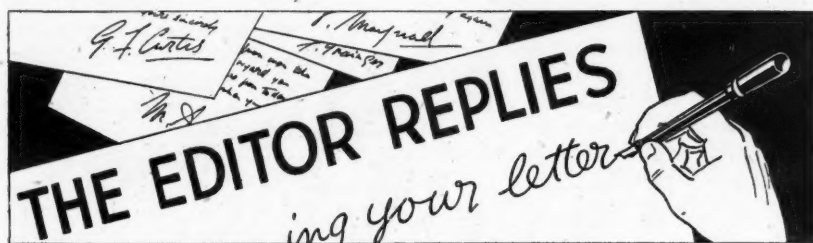
Mr. Hicks: Fluorescent lighting is extensively used both in this country and in the United States of America to secure evenly distributed illumination over a wide area with the minimum of glare, and it is accordingly the policy of the Ministry to provide this lighting in rooms from which daylight is excluded and where important war work is being carried on. Such lighting has been installed in practically all cases in which these conditions obtain. I am not aware of any grounds for suggesting that the light is deleterious to the human eye, provided proper precautions are taken to prevent flicker, but if the Hon. Member has any information to the contrary I shall be glad to receive it.

## Prismatic Bulkhead Fittings



We illustrate a type of prismatic bulkhead fitting now being offered by Revo Electric, Ltd. This is specially suitable for use in corridors, ships, and underground buildings, and in all situations where headroom is limited.

We have also to acknowledge the receipt of a well-illustrated leaflet describing the new "Trufolite" reflector fittings for fluorescent lamps. These have several ingenious features, notably the provision of ready access to control accessories, which are all housed in the ends of the reflector.



The remarks in recent issues on **Limitation of Diversity Factor** remind me of some literature received from Mr. George Ainsworth, the apostle of "**brightness equilibrium**" in the U.S.A., who likewise condemns the practice of rating installations in terms of "average foot-candles," but ignoring great variations in brightness, not only on the working plane, but in the surroundings.

His ideas are illustrated in a leaflet describing his interesting method of lighting with **fluorescent lamps** on what is virtually a **semi-indirect basis**. The lamps have a plastic (translucent) reflector below them so that light is largely directed on the ceiling, which has a brightness of the same order as that of "the sky shortly before sunset." The lighting unit "fades into" the ceiling, which appears to be of substantially uniform brightness. As one (40 w.) lamp is commonly allotted for every 10 sq. ft., quite high illuminations may be attained.

I notice that at a recent I.E.S. meeting Mr. P. J. Waldram registered an "energetic protest" against the conception of **the windowless building**. The Fifth Report of the Departmental Committee on **Factory Lighting** strongly emphasised the value of arrangements for the entry of a fair proportion of daylight into blacked-out interiors—though it is vital that the admitted daylight should blend well with the artificial lighting and aid

it. Strong local daylight illumination, and still more a confined shaft of bright light descending through a narrow aperture, may, by contrast, prejudice the effect of the artificial lighting, and may even prove positively dangerous.

Even from the **psychological standpoint** the issue is not quite clear. It has been said that workers are often well satisfied to work continuously under artificial light, provided that some windows are exposed, so that they realise that it is daytime. On the other hand I recently heard of a case of dissatisfaction with artificial lighting that was due not to any actual fault therein but to the fact that some daylight was admitted and this caused the artificial light to appear poor in comparison. Evidently, as Captain Cuttle affirmed, "the bearings of an observation lie in the application thereof."

The more reasonable measures now adopted for the lighting of stairways and descents to tubes and subways have mitigated the worst instances of **the "black-in"** and the inconvenience attending entries from bright sunshine. My attention has, however, been drawn to one particularly troublesome case **on railways** where men are constantly coming into yards which are necessarily subjected to permanent black-out. Here entry may be made from many directions, and the men have not merely to

see their way but to read labels and directions for transport. Inability to see after entry from bright daylight causes much waste of time. The only remedy seems to be to provide a band of relatively high artificial illumination near the entrances.

It is difficult to state precisely what the illumination should be, but my own experience goes to show that an **illumination of, say, 10 ft.c.** would go a long way towards eliminating the trouble. I have observed that on stairways receiving about 2-3 ft.c. little trouble is experienced on entering from moderate daylight, though admittedly one must still pause when there is sunlight outside. (The great difference in the illumination received on a dull day and that derived from full summer sunlight is not always appreciated.)

In the case mentioned above the supplementary band of illumination should be extinguished or very much reduced after nightfall. Such action is, in fact, always expedient, even in normal circumstances, in the case of **tunnels and subways** carrying traffic. I recall that on subways in Paris and in the United States this has been effected by automatic photoelectric control.

It has been suggested to me that the conference on **post-war street lighting**, summarised in our last issue (October, 1943, pp. 151-158), revealed a somewhat conservative view of future possibilities, more especially in regard to the use of fluorescent tubes and searchlights.

A distinction should, however, be drawn between the lighting of traffic routes or roads with open space on either side and city streets. In the case of the former, which is the main problem, methods that have proved their

worth in pre-war days may continue to be accepted as the best available. But in cities, and especially in shopping areas, there may be other possibilities. **Fluorescent tubes**, whilst possibly awkward to mount on lamp-posts, might sometimes be attached to the **surfaces of buildings** on either side, thus furnishing valuable diffused lighting to supplement the effect of lighting units on posts relatively far apart and even, on occasion, obviating the need for lamp posts and their admitted obstructive inconveniences.

The practical difficulties involved in the more fanciful ideas of using **searchlights** to illuminate the clouds (if any) or **lights attached to captive balloons** are evident. Some of them were effectively demonstrated by Mr. J. M. Waldram. Yet I can imagine that even these ideas might be exploited on occasion, though presumably as a supplement rather than a substitute for ordinary methods of public lighting.

I continue to receive comments on the **Drawbacks of the Blackout and Economies in Lighting**. It seems evident that no radical change in regard to the blackout is likely to be approved in the immediate future, though certain concessions, small but helpful (such as the permission to use more light to illuminate destination plates of public vehicles), have recently been announced.

I do agree that economy in lighting (occasionally confused with blackout requirements) is sometimes overdone—even bearing in mind the urgent need for saving in fuel. Personally, I find the inequalities of illumination in some tube carriages (five lights out of fourteen in a row being sometimes extinguished) particularly irksome.

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## "The Planning of the Gas Industry"

The gas industry has submitted to the Minister of Fuel and Power a comprehensive report on the above subject—the result of two years of research. The contents of the report have been fully discussed by all sections of the industry. It aims at the formation of a British Gas Association to supersede various other existing national gas bodies, whose Central Council will act as a "Parliament" for the industry. It also advocates methods of integration of undertakings throughout the country to provide a better service to the community after the war and to hasten the extension of gas into rural areas.

It is further suggested that the Ministry of Fuel and Power should appoint a National Fuel Advisory Council to facilitate the elimination of wasteful competition between the fuel industries and to encourage constructive co-operation.

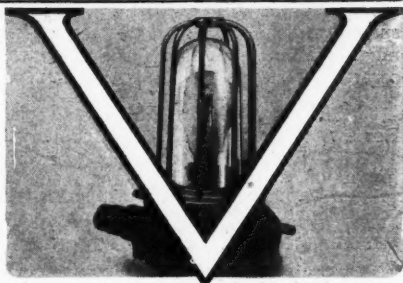


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## VITREOSIL *in* MINE LIGHTING

The application of the super-pressure Mercury Lamp to mine lighting was described in *Light & Lighting* (September, 1940, issue). Transparent VITREOSIL, pure fused silica, has been manufactured for over 30 years and is used in the super-pressure Mercury Vapour Lamp on account of its high heat resistance.

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## Literature on Lighting\*

(Abstracts of Recent Articles on Illumination and Photometry in the Technical Press)

(Continued from p.126, August, 1943)

### PHOTOMETRY AND INSTRUMENTS

**58. Photometers.** Anon. Review of Scientific Instruments. Vol. 14. No. 7. These instruments are small filter photometers for chemical analysis in the routine or control laboratory, and in the clinical laboratory. They consist of a low voltage light source, an adjustable light aperture, receptacles for tubular or rectangular absorption cells, a three-coloured filter holder and a photo-electric cell and measuring instrument. The measured transmissions of an unknown solution are compared with a standard analysis for solutions of that type. W. E. L.

**59. Optical Contour Comparator.** Anon. Review of Scientific Instruments. Vol. 14, No. 7. A new contour comparator is described. An aspheric condenser system operates in conjunction with a special projection lens to produce a 24x magnified image in a ground glass screen 9 x 15 inches. W. E. L.

**60. Monochromatic Light.** Anon. Review of Scientific Instruments. Vol. 14, No. 7. A summary is given of the advantages of using light from a sodium vapour lamp for various visual tasks, including inspection and the creating of interference bands for checking surfaces by means of optical gauges. Its use in microphotography is also advocated. W. E. L.

**61. Mirror Making.** K. P. Gladney. The Glass Industry, August, 1943. A critical review is given of the methods used in silvering mirrors. Particular attention is paid to the spray-coating method. W. E. L.

### LIGHTING EQUIPMENT

**62. War-time Reflectors.** E. H. Robinson. Magazine of Light, XII, No. 1, pp. 17-19, January, 1943. The develop-

ment of non-metallic reflectors for fluorescent tubular lamps is discussed.

C. A. M.

**63. Arc Welding.** J. P. Ditchman. Magazine of Light, XX, No. 2, pp. 14-17, March, 1943. The frequent flashes of high brightness from arc welding plant were found to give distraction and discomfort to other workers in the same room. This problem was solved by raising the general illumination level to 150 f.c. from mercury vapour lamps with white walls, girders, etc., thus reducing the contrast. C. A. M.

### APPLICATIONS OF LIGHT

**64. What's Ahead in Lighting?** S. B. Williams. El. World, 120, p. 271. July 24, 1943. An extensive review is given, in which the trend of light sources, equipment, and lighting practice is examined, and an attempt has been made to indicate the form that these will take in the post-war era. S. S. B.

**65. Public Utility Office Lighting.** Anon. Magazine of Light, XII, No. 1, pp. 20-21, January, 1943. Details with a diagram of photographs are given of a built-up fitting of the continuous type using four fluorescent lamps abreast. C. A. M.

**66. Engineering Twenty-four Hours "Daylight."** C. F. Prideaux. Magazine of Light, XII, No. 3, pp. 8-15 and 37, May, 1943. Consideration is given to the lighting problems arising in factories of the windowless pattern with particular reference to the difficulties of maintenance. C. A. M.

**67. Choosing an Industrial Lighting System.** C. E. Weitz. Magazine of Light, XII, No. 1, pp. 30-35, January, 1943. The general considerations in providing industrial lighting are dealt with in some detail. The light sources available are discussed and the appropriate lighting equipment is listed. Exposed brightness values are also given for numerous assemblies. C. A. M.

**68. Fluorescent Lighting.** A. B. Van Riper. Magazine of Light, XII, No. 1, pp. 10-11, January, 1943. Details with

(Continued on page 180)

\*We regret that we are unable to furnish copies of original articles to readers.—Ed.

## Further Applications of Fluorescent Lighting

Instances of the effective use of fluorescent lighting in industry continue to be received. A typical case is that of Messrs. Porter Bros., of Liverpool, who are now working to capacity on Government contracts. In pre-war days this firm had the reputation of being the largest makers in the United Kingdom of flags of all kinds—not only Union Jacks but code and signal flags, regimental flags, and flags and banners used by bodies of all descriptions.

In all such work, involving the sewing of coloured materials, a high illumination, coupled with resemblance to daylight, so that the system may blend well with natural lighting, is of great importance. Fluorescent lighting was accordingly installed by the electrical contractors, Messrs. John Hunter and Co., of Liverpool, under the supervision of Mr J. J. Wilson. In all forty 80-W 5-ft. Crompton fluorescent tubes are installed. An illumination of 17.5 ft.c. is now achieved, with a current consumption not exceeding that of the old installation. In other respects the installation has given great satisfaction, the low surface brightness and absence of glare being specially good features. As a result the general health of the machinists shows improvement and there has been a material increase in



Fig. 1. A view of a workroom of Messrs. Porter Bros., of Liverpool.

production. Fig. 1 shows a general view of a section of the installation.

In Fig. 2 an installation of a somewhat different character is shown. This is a machine tool factory in Yorkshire, where forty-three Mazdalux (single light continuous trough) fittings, housing Mazda 80-W fluorescent lamps, are installed. The mounting height is 7 ft. 6 in. above floor level, 13 ft. being allowed between rows, and an average illumination of 20 ft.c. is provided.

This is stated to be the first "continuous trough" installation in the West Riding of Yorkshire.

We have also received particulars of another interesting installation, in an old mill situated in the West of England. Here the original lighting from tungsten lamps in conical iron shades gave rise to excessive glare and harsh shadows. A great improvement has been effected by a modern installation of "Metrovick" 80-W fluorescent lamps in continuous troughing, about 22 ft.c. being provided. Redecoration of the interior has enhanced the effect of the new lighting. Another improvement effected by the engineers of Metropolitan Vickers Electrical Company has been the replacement of the original old water-wheel by a new water turbine which drives a 20-kW alternator and provides power for electric lighting and sundry machinery.



Fig. 2. A notable continuous trough installation in a machine tool factory in Yorkshire.

(Continued from page 178)

photographs are given of the lighting equipment of experimental workshop at an ammunition plant in America. Continuous runs of fittings are used, each fitting carrying three 40-watt tubular fluorescent lamps and producing 75 foot-candles on the working plane.

C. A. M.

**69. Making Service Uniforms.** Anon. *Electrical Times*, Vol. 104, No. 2, 708. The sewing room of a factory making Service uniforms is lighted by 5-ft. lamps in open-top reflectors placed diagonally across the double row of sewing machines. The reflectors are hung between two strained catenaries to allow for variation in positioning of reflectors over working areas. W. E. L.

**70. Maintenance.** H. Chanon. *Magazine of Light*, XII, No. 2, pp. 7-11 and p. 33, March, 1943. Representative maintenance schedules of an aircraft factory in America are detailed. Group replacement of lamps is carried on throughout. Frequency of cleaning is governed by experience of the various processes conducted. Records of illumination values before and after cleaning are kept. Typical cleaning and relamping costs per fixture are given. An appendix to the article makes a direct comparison between fluorescent and filament system maintenance costs.

C. A. M.

**71. Airplane Instrument Illumination.** K. D. Scott. *Magazine of Light*, XII, No. 4, pp. 22, 23, 30, July, 1943. A small low wattage fluorescent lamp with a filter is used in America to activate fluorescent instrument dials on aeroplanes. The coating on the lamp converts the arc radiation to "near U.V." and the filter excludes visible radiation.

C. A. M.

**72. Lighting Balances.** Anon. *Electrical Times*, Vol. 104, No. 2, 708. The balances in an assaying room are lighted by 5-ft. fluorescent tubes in industrial-type reflectors, each tube being hung immediately above two balances. A small matt white reflecting surface is placed inside the front and at the floor of the balance to reflect light on to the balance beam. W. E. L.

## Reviews of Books

*Reading as a Visual Task*, by Matthew Luckiesh and Frank K. Moss (D. Van Nostrand Co., New York, 1942; pp. 428; figs. 76).

This addition to the series of works with which Dr. Luckiesh is associated is a valuable one. The present volume is supplementary to two others, for which these joint authors were likewise responsible, on "The Science of Seeing" and "A Partnership of Light and Vision." In an introduction Mr. H. L. Gage draws attention to the vast amount of printed matter issued to-day, and the first chapter emphasises the complexity of the task of reading which is, indeed, in a sense, an unnatural one.

The next two chapters enumerate aids to seeing, embracing the eye and its accessory equipment, and the external conditions determining the visual impression which in turn are linked with many factors (brightness, contrast, papers and inks, eyeglasses and other aids to vision). The assessment of visibility follows, and the visibility meter devised by the authors is described.

This leads to the intermediate section of the book which is concerned largely with criteria of visibility, types, papers and inks, and other factors involved in the preparations of printed and duplicated matter. After this we return to what is more strictly the visual side, the behaviour of the eyes, reading performance, and the psychological effects associated with reading being discussed in turn. This brings us to the final chapter in which specifications for optimum readability are presented.

The book thus links together factors which are too often considered separately. If there are some aspects on which experts may disagree—such as the inferences made from the study of the rate of blinking by the eyes—there is a great deal which is extremely revealing and which must command general approval.

In the execution of the book the precepts of the authors are closely followed. It is printed in 11-point type on a 13-point body and on matt paper (glossy paper being used only occasionally for half-tone illustrations), and the general effect is delightful. Helpful final items are the glossary of technical terms and the series of specimens of type.

